

ASSIGNMENT-2 REPORT

BOLLINGER BANDS

Bollinger Bands are a type of price envelope developed by John Bollinger. (Price envelopes define upper and lower price range levels.) Bollinger Bands are envelopes plotted at a standard deviation level above and below a simple moving average of the price. Because the distance of the bands is based on standard deviation, they adjust to volatility swings in the underlying price.

In the task we had to develop a strategy and generate buy and sell signals using bollinger bands

TRADING STRATEGY

Middle Band = 20-day simple moving average

Lower Band = (20-day standard deviation of price x 2) + 20-day SMA

Upper Band = 20-day SMA – (20-day standard deviation of price x 2)

A trading signal is obtained whenever the middle band crosses the upper or lower band. Whenever the middle band crosses the lower band a buy signal is generated whereas when the middle band crosses the upper band a sell signal is generated.

This is a theory that the price of an asset will tend to revert to its average price over time. For instance, if the asset price falls 'too much', it will tend to revert to a 'normal' price. A 'normal' price area, in this case, is within the upper and lower bands or around the middle band. Just by watching Bollinger Bands on a chart, traders can watch price extremes or simply periods when the price has deviated so much from its mean. Mean reversion is excellent for trading ranging markets, with the upper and lower bands acting as dynamic links for resistance and support, respectively. This means that traders will look to place buy orders when prices are at or close to the lower band, and they will place sell orders when prices are at or close to the upper band

So I tried to implement this trading strategy and evaluated it using parameters like sharpe ratio.cumulative returns etc. But the results were not that good since the sharpe ratio turns out to be negative.

Inferences-

Since the strategy is not giving desired results it could be due to certain problems like-

1)The points at which the middle band crosses the upper and lower bollinger bands may present the start of a trend rather than acting points of mean reversal.In such cases with the trend our signals could be wrong

2)Bollinger Bands use SMA of the past 20 days as a middle band,which is not ideal since it gives equal weightage to older data.

Possible Solutions-

Bollinger Bands can be combined with any suitable momentum indicator,which helps us to know the trend of the market at that time. This will help us know whether the intersection point will signal start of a trend(if momentum indicator also shows strengthening of market) or will act as mean reversal point.

RELATIVE STRENGTH INDEX ANALYSIS

1. Introduction:

The RSI is a popular technical indicator used to identify overbought and oversold conditions in the market, which can be used to generate buy and sell signals.

2. Approach:

The trading strategy based on RSI involves the following steps:

a. Define RSI threshold levels: Typically, a buy signal is generated when the RSI falls below a certain threshold (e.g., 30), indicating an oversold condition. Conversely, a sell signal is generated when the RSI rises above a threshold (e.g., 70), indicating an overbought condition.

b. Generate buy and sell signals: Calculate the RSI values based on historical data and compare them with the defined threshold levels. The formula to calculate the RSI is as follows:

$$RSI = 100 - \frac{100}{1 + RS}$$

RS = Average Gain / Average Loss

When the RSI crosses below the buy threshold, a buy signal is generated, and when it crosses above the sell threshold, a sell signal is generated.

c. Execute trades: Based on the generated signals, execute appropriate trades, such as buying or selling the stock or entering/exiting a position.

3. Coding Implementations:

The trading strategy based on RSI can be implemented using various programming languages. In this report, we used Python and the following libraries:

- pandas: For data manipulation and analysis
- yfinance: For downloading historical stock data
- numpy: For numerical computations
- matplotlib: For visualizations

The code implementation includes functions to calculate the RSI, generate signals, backtest the strategy, and analyze performance metrics.

4. Backtesting Results:

To evaluate the performance of the RSI trading strategy, we conducted backtesting using historical data for a specific stock (e.g., Infosys - ticker symbol: INFY). The backtesting process involved the following steps:

- a. Collect historical data: We used the yfinance library to download historical stock data for the specified period.
- b. Calculate RSI: Based on the historical data, the RSI values were calculated using the defined window size (e.g., 20).
- c. Generate signals: Buy and sell signals were generated based on the RSI values and threshold levels.
- d. Backtest the strategy: The strategy was backtested by simulating trades using the generated signals and calculating the strategy returns and cumulative returns.
- e. Calculate performance metrics: Performance metrics such as the Sharpe ratio were calculated to assess the risk-adjusted returns of the strategy.

5. Analysis and Inferences:

The analysis of the backtesting results and performance metrics provides insights into the effectiveness of the RSI trading strategy. The key observations and inferences from the analysis may include:

- a. Cumulative returns: The cumulative returns plot indicates the profitability of the strategy over the backtested period.
- b. Sharpe ratio: The Sharpe ratio measures the risk-adjusted returns of the strategy. A higher Sharpe ratio indicates better risk-adjusted performance.
- c. Buy and sell signals: The visual representation of buy and sell signals on the price chart helps identify the timing and effectiveness of the strategy in capturing market trends.

d. Strategy performance: Assessing the strategy's performance during different market conditions, such as trending or range-bound markets, can provide insights into its adaptability and effectiveness.

6. Proposed Improvements:

Based on the analysis and observed results, the following improvements or considerations may be proposed:

Optimize threshold levels: Fine-tuning the RSI threshold levels may improve the strategy's performance by capturing more accurate buy and sell signals.

BOLLINGER-RSI Indicator

Our strategy is based on the fact that when the RSI is over 70 and the middle band hits the upper bollinger band means the stock has been overbought and we should sell the stock.

On the other hand if RSI falls below 30 and the middle bar hits the lower bollinger band means the stock is oversold and we should buy the stock.

Strengths-

1)By combining RSI and Bollinger Bands, traders can better understand the current market environment, helping them make more informed decisions. This is because through these indicators we are combining both momentum and volatility.

2)The RSI with Bollinger Bands indicator can be applied to various markets, including stocks, forex, commodities, and cryptocurrencies.

Weaknesses-

1)The indicator may generate false signals, leading to potential losses. To mitigate this risk, use the indicator with other technical analysis tools.

2) Both RSI and Bollinger Bands are lagging indicators, meaning they rely on historical data to generate signals. As a result, they may not always accurately predict future price movements.

Contribution-

Samyak - Worked on the bollinger band strategy,code and its documentation

Shrasti-Worked on the RSI indicator,its code and documentation

Combined Indicators-Worked together on its code and documentation